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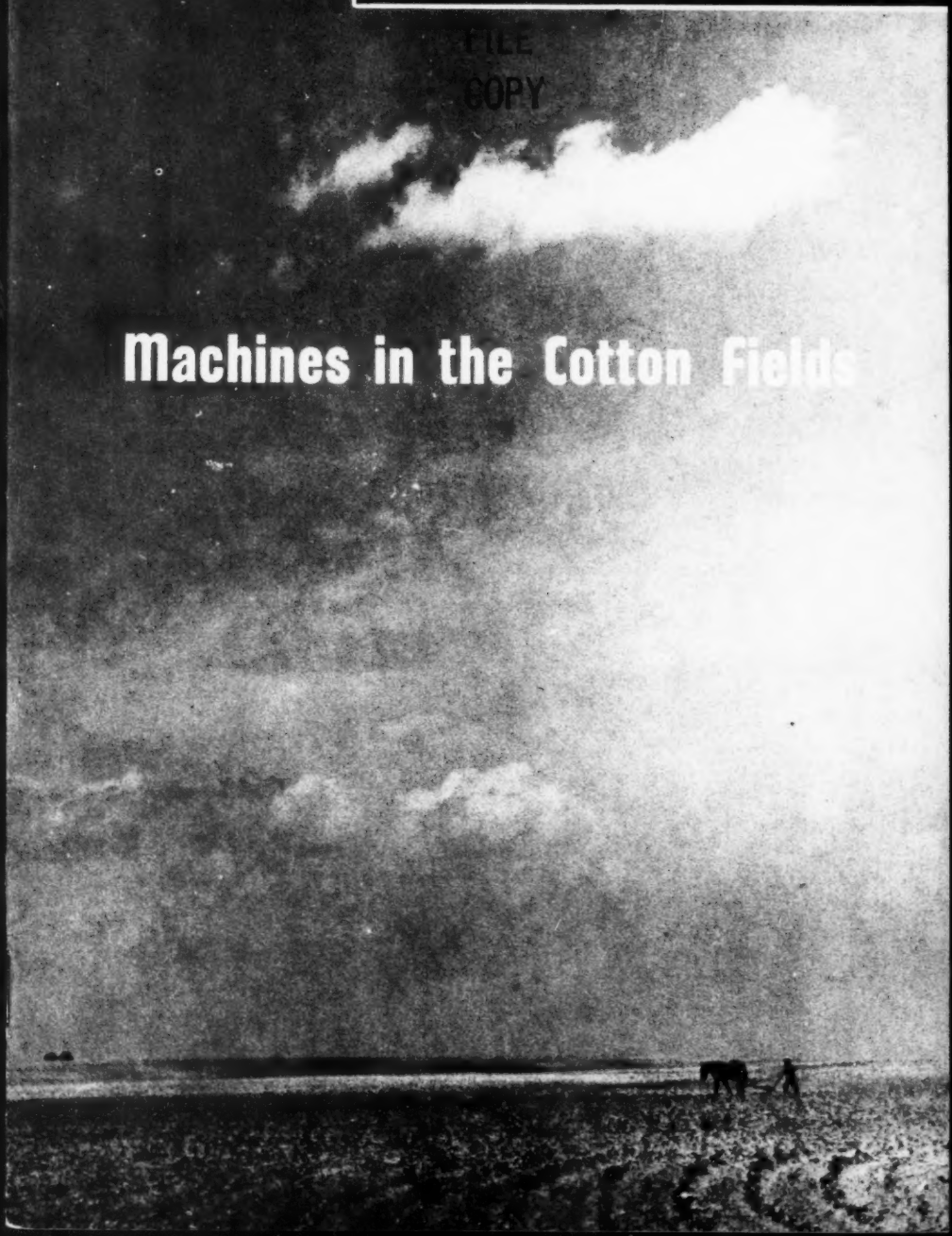

Machines in the Cotton Fields

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Mechanization Comes to the Southern Cotton Farm

Machines in the Cotton Fields

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In preparing land for cotton planting one man with a medium-sized tractor and equipment can do about three times as much as a man with two-horse equipment, about six times as much as a man with one-horse equipment.

The Old and the New

IN DISCUSSING the role of agricultural technology in Southern social change, we need first of all to recall that cotton and tobacco, the farmers' main sources of cash in the South, are two of the least mechanized crops in the Nation. Hand labor plays the major part in both of them. Axes, mattocks, hoes and simple one- and two-horse plows are standard equipment. The typical tobacco farmer uses no implements or tools more complicated than a mercury thermometer and the one-row fertilizer distributor — and much fertilizer is still put in the row by hand. The cotton farmer's implements have been a one-horse seed planter, a one-horse fertilizer distributor, and scales to "weigh up" the cotton at picking time in the fall. Sugar cane, too, has traditionally been planted and harvested by hand operations.

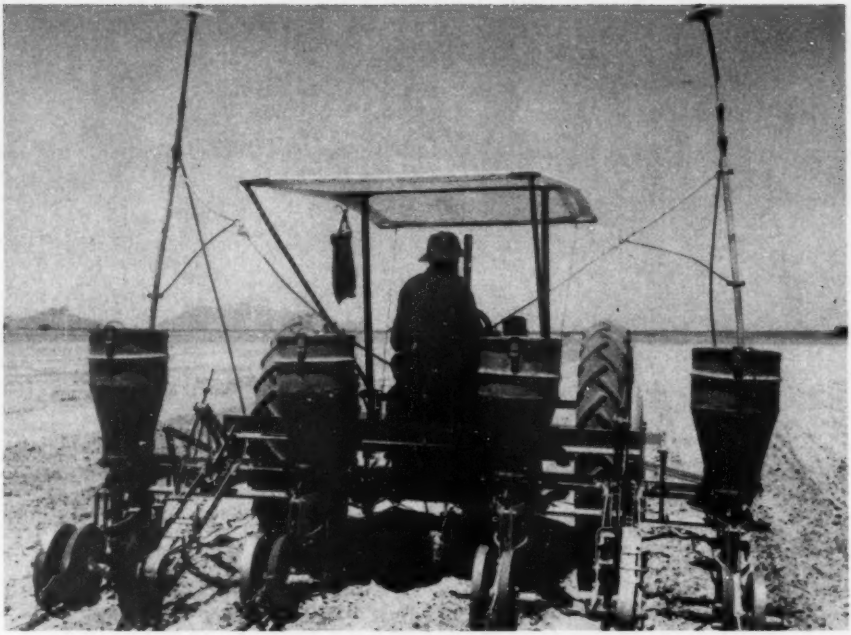
Cotton gins, cotton oil mills, textile mills, tobacco factories, and sugar cane mills have always looked like projections of another kind of world into the Southern countryside, and that is exactly what they are. The mechanization of cotton ginning, spinning, and weaving got under way in the early 1800's; the manufacture of sugar from cane juice was already well established; and over a half century ago the manufacture of chewing and smoking tobacco was becoming big business. We need then, first of all, in thinking about the social effects of current technological development in Southern agriculture to

make certain that we understand our base lines — namely, the production in the field by hand methods of crops which have for many decades now been processed upon leaving the farmer by big machines and mass production methods, which are in harmony with the rest of the National economy.

No farm machinery or techniques are in sight to do more than merely reduce the hand labor in tobacco growing, but the outlook for mechanization in the cotton and sugar cane crops is another matter. The tendency of farmers to produce these crops by the traditional hand methods will be offset in considerable part by the immediate economic advantages in the use of machines. More tractors are being purchased. The mechanical cotton picker is now in an advanced stage of development, and some of these machines are already in use in the Mississippi Delta. The use of the mechanical cane cutters has been increasing and seems likely to spread further. The gains in mechanization thus promised may go far toward solving some of the South's old economic and social problems. And as a part of the process they would create some very important new problems.

Since cotton is the South's leading crop, and since it is now beginning to be mechanized, let's simplify our discussion by centering our attention on it. The reliance on hand methods of cotton production encouraged the early emergence and spread of plantation farming. Slaves could be used primarily because of the hand processes used in growing cotton. The later use of hired workers and the development of sharecropper farming were adaptations of the basic socio-economic organization that became established before 1860, with these relationships always being modified to meet new conditions as they develop — but nearly always in harmony with what has gone before, with the need for hand labor continuing. Involved in the Southern agriculture situation has been the presence of two distinct

Planting cotton with one-horse equipment, as in the picture below, calls for three men to equal the work of one man with a tractor and two-row planters, and requires six men to do the work of one man with four-row planter equipment such as that shown on the opposite page.

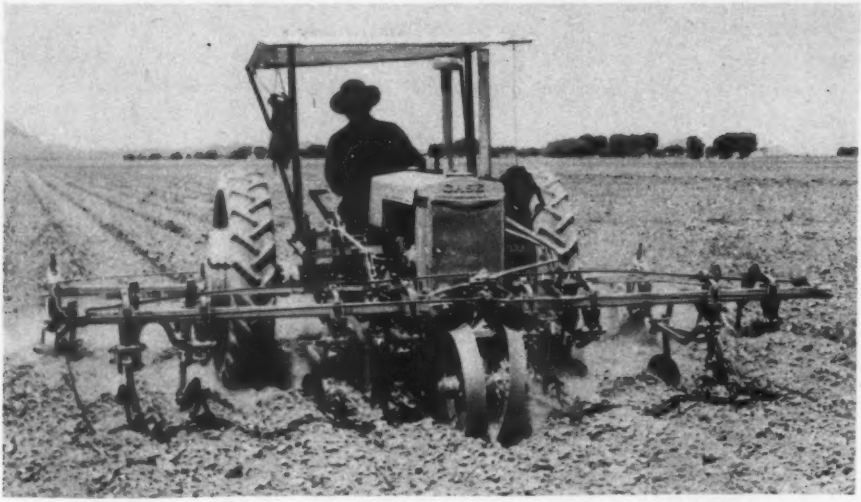


racial groups, with one of them occupying a definitely lower position than the other from the outset. Hand labor provided something of a "natural place" in the economy for the nether group. The lower-income whites also did hand labor, but they could move on to the frontier, or out of the slave area entirely if they liked. The passing of the frontier decades ago and the increasing need for livelihood opportunities within the Southern settled areas have increased the number of whites who live primarily by hand-produced cotton until they now outnumber the nonwhites more than two to one.[1]

The great reliance on hand labor early became institutionalized in free housing of wage hands and tenant farmers by the landowners. Since enough resident workers were available for the busiest season, that of picking, the practice of using migrant laborers did not develop, nor was there any practical reason for the landowners to mechanize the other steps of production.

Such are some of the factors responsible for the relatively large number of farm families in the South, and, generally speaking, the small farms they operate, and the relatively low range of skills they have learned. These factors lie back of the poor housing, poor health, and poor nutrition that is found in many rural areas of the

1. In the 690 counties in the Cotton Belt in 1940 there were 1,217,325 white farmers and 563,118 Negro farmers. White tenant operators numbered 597,912 and Negro tenants 461,982. Tenants accounted for 49.1 percent of all white farmers, and 82.0 percent of all Negro farmers.



In cultivation of cotton one man with a four-row cultivator, such as this one, can do the work of ten men working with one-horse plows.

region. This explains much as to the political and social institutions here. They are the roots of the old "furnish" system, of the need for production of crops with borrowed money, and of the state crop lien laws that make it possible for farmers without property or credit to obtain supplies to grow a crop.

It is against this complex rural life situation that the coming of farm machinery has meaning. Naturally enough, the first extensive use of farm machinery in the South occurred in the plains of West Texas and Oklahoma, out where the cotton country fades off into the breezy equalitarianism of the range-livestock areas and the wheat areas. This part of the cotton country was settled last, has always had fewest sharecroppers, and has put least value on supervising other people's work and most value on work itself. This is the area of the South that is least characterized by the very characteristics that give the older rural South its distinctive qualities.

In Southern agriculture, the increase of mechanization will probably result in even greater social changes than it has in the other parts of the country. In the Corn Belt and in the Wheat Areas, for example, the farm tractor speeded up mechanization, but it did not initiate mechanization, for great horse teams were already being used widely to power gang plows, discs, wide drills, binders, headers. In the Southern States, heavier farm machinery has usually been brought in with the tractor, for practically nowhere has the equipment been larger than for two horses.

If the above background analysis is correct, an increase of farm tractors (and tractors are used as something of an index for all farm

Great numbers of hoe hands are needed to keep the rows of growing cotton clear of grass and weeds. Experiments with hill planting, cross-row plowing, mechanical cotton choppers, check-row planting, and the use of multiple-row flame-throwers have led some growers to believe that in a few years hand-hoe work in cotton may be practically eliminated in those areas of the Cotton Belt where mechanization is most advanced.

machinery) would be expected to be accompanied by an increase in the size of farms, a decrease in the number of farm operators, the greater decrease of tenants than of owners, and a greater decrease of colored farm operators than of white operators.[2] An increase or livestock farming or the retirement of crop lands from cultivation to timber production would also have something of the same effect in increasing the size of farm units, in reducing the number of farmers, and in raising farm income levels. These things would all operate in the same direction because they would all be starting in reverse the basic forces that have maintained the small hand-operated farming in the South.

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2. It is hardly necessary to point out here that this paper does not suggest that all the changes that are occurring in farm tenure and race composition of farm operators in the South are attributable to the increase of mechanization. It is generally known that the crop-control programs since the early 1930's have been dynamically related to tenure changes and therefore not unrelated to the racial composition of the farm operators as a group, and that off-farm work opportunities during the prosperous years and urban relief standards during the depression years attracted many families from cotton farms, and that there are numerous other causal factors involved. It should be recognized, however, that the crop-control programs themselves increased mechanization by affording greater incentives toward efficient operations. The migration of hand workers from cotton farms for whatever reason makes labor relatively more scarce and relatively more expensive and thus operates to speed up the mechanization of cotton production.

The Changing Farm

NOW, let us see what changes have already occurred in the number of farms, and the tenure and race of farm operators since 1930 as the number of tractors has increased[3]. It will be noted in Table I that in no one of the 13 Southern States did the percentage of farm operators using tractors come up to the national average, though Oklahoma and Texas approximated it, while Florida, with about half the national average, stood next. All three of these states, and especially in those parts of them that are most mechanized — central and southern Florida and the Plains area of Texas and Oklahoma — have least of the plantation background, fewest sharecroppers, fewest Negroes, were latest settled and least involved in the War of the 1860's. On the other hand, the lower Southern states of Mississippi, Alabama, Georgia and South Carolina, had the smallest incidence of tractors, all of these below one-fifth of the national average in 1945, with but slightly higher averages in Louisiana, Arkansas, North Carolina, Kentucky, and Tennessee.

The percentage increase of tractors was greater for the Southern States than for the Nation from 1930 to 1940 and from 1940 to 1945. The greatest increases between 1930 and 1940 occurred in the West South Central States while from 1940 to 1945 the greatest increases occurred in the Old South where tractors came in latest. Eight states

3. In view of the many studies already made of the effects of an increased number of tractors in increasing the size of farms and in reducing the number of horses and mules, etc., it seems unnecessary to present details on these points here. Also since other studies discuss the historical development of tractor farming, this statement is limited to the period since 1930. See R. B. Vance, *All These People*, (Chapel Hill, North Carolina, 1946), especially pages 192 to 212; C. Horace Hamilton "The Social Effects on Recent Trends in the Mechanization of Agriculture," *Rural Sociology*, Volume 4, No. 1, March, 1939; C. A. Bonnen and A. C. Magee, "Some Technological Changes in the High Plains Cotton Area of Texas," *Journal of Farm Economics*, XX, August, 1938; W. C. Holley and Lloyd C. Arnold, "Changes in Technology and Labor Requirements in Crop Production: Cotton," WPA National Research Project Report A-7, (Philadelphia, 1938); "Technology on the Farm," A Special Report by an Interbureau Committee of the Bureau of Agricultural Economics, (Washington, D. C., 1940); R. J. Saville, "Trends in Mechanization and Tenure Changes in the Southeast," *The People, the Land and the Church in the Rural South* (Chicago, Farm Foundation, 1941); Paul S. Taylor, "Power Farming and Labor Displacement in the Cotton Belt, 1937," *Monthly Labor Review*, March and April issues, 1938, Vol. 46, Nos. 3 and 4.

Table 1.—Percent of Farm Operators Reporting Tractors on Farms in 1930, 1940 and 1945,* and Percent Increase from 1930 to 1940, and 1940 to 1945 for Selected States**

State	Farm Operators Reporting Tractors on Farms				
	Percent Reporting Tractors			Percent Change	
	1930	1940	1945[1]	1930–40	1940–45[2]
United States	13.5	23.1	30.5	70	32
13 Southern States	3.9	7.8	11.0	90	44
8 Cotton States***	3.9	9.3	13.2	112	43
South Atlantic****	3.6	4.8	7.3	30	52
Virginia	5.4	6.2	8.4	22	36
North Carolina	3.9	4.3	6.4	12	63
South Carolina	2.0	3.1	5.4	38	75
Georgia	2.1	3.8	5.9	59	57
Florida	7.4	10.2	14.4	47	42
East South Central	2.1	3.6	5.3	72	50
Kentucky	2.8	4.4	6.2	63	41
Tennessee	2.7	4.4	6.7	72	53
Alabama	1.7	2.9	4.5	64	56
Mississippi	1.5	2.7	4.1	91	50
West South Central	5.7	14.9	20.9	125	49
Arkansas	1.8	4.3	6.6	121	53
Louisiana	2.4	4.6	6.9	89	50
Oklahoma	11.4	22.9	30.3	75	32
Texas	6.4	20.6	29.1	165	42

*Figures for 1930 and 1940 from U. S. Census; Figures for January 1, 1945 are taken from estimates made by Bureau of Agricultural Economics as shown in "Number and Duty of Principal Farm Machines", by A. P. Brodell and M. R. Cooper, F. M. 46, Washington, D. C., November 1944.

**The percentage of farm operators using tractors in January 1945 was arrived at by showing a percentage gain in operators from 1940 to 1945 equal to the percentage gain in number of tractors during the 5-year period.

***South Carolina, Georgia, Alabama, Mississippi, Louisiana, Arkansas, Texas, and Oklahoma.

****Excludes Delaware, Maryland, D. C., and West Virginia.

had increases of 50 per cent or over during the five-year period. These high recent increases, however, have not brought the rest of the South anywhere near the tractor average of the Oklahoma and Texas farmers.

Now, over against this increase of tractors by states, let's look at the changes in number, tenure, and race of farm operators. For the 13 Southern States there was a decrease in number of farm operators between 1930 and 1940 of 7.5 percent, and for the 1940 to 1945 period 3.7 percent, while for the eight principal cotton states[4] the losses were 11.8 percent and 4.7 percent respectively. The decrease for the West South Central States between 1930 and 1940 was 12.6 percent and 7.9 percent between 1940 and 1945.

4. South Carolina, Georgia, Alabama, Mississippi, Louisiana, Arkansas, Texas and Oklahoma.

Table 2. Percent Change in Farm Operators by Tenure, 19

State	Percent Change in total Farm Operators 1940–45**	Per			
		White and Nonwhite			
		Total	Owner	Cropper	Other Tenants
United States	-3.6	-3.1	3.1	-30.3	-3.6
13 Southern States	-3.7	-7.5	8.8	-30.3	-11.5
8 Cotton States***	-4.7	-11.8	9.2	-34.5	-14.0
South Atlantic****	3.3	-5.8	7.3	-27.7	-8.2
Virginia	-1.0	2.5	4.2	-5.9	0.5
North Carolina	3.3	-0.5	8.9	-12.7	-7.8
South Carolina	7.0	-12.9	9.4	-31.6	-18.8
Georgia	5.6	-15.5	6.1	-39.6	-6.3
Florida	0.9	5.6	10.3	-29.3	2.9
East South Central	-5.6	-3.7	9.1	-17.5	-10.3
Kentucky	-5.6	2.6	7.0	-22.2	3.6
Tennessee	-4.8	0.8	11.9	-17.5	-7.9
Alabama	-1.8	-10.0	5.0	-36.5	-6.4
Mississippi	-9.4	-6.9	12.9	-7.3	-25.5
West South Central	-7.9	-12.6	10.0	-47.3	-14.1
Arkansas	-8.0	-10.6	12.9	-36.5	-12.7
Louisiana	-13.4	-7.1	12.9	-19.8	-14.8
Oklahoma	-6.7	-11.9	4.2	-76.5	-10.9
Texas	-6.5	-15.6	10.2	-62.1	-16.2

-Minus sign means decrease.
*U. S. Census 1930 and 1940, and Preliminary returns of Agricultural Census of 1945.
**Figures for tenure and race are not yet available for 1945 Agricultural Census.
***South Carolina, Georgia, Alabama, Mississippi, Louisiana, Arkansas, Texas, and Oklah
****Excludes Delaware, Maryland, District of Columbia, and West Virginia.

When the decreases are analyzed by tenure for the 1930-1940 decade, the owners showed a distinct gain in every one of the 13 States, the croppers a great loss, with all other tenants showing losses rather small when compared with the losses of croppers. The greatest losses of croppers occurred in Oklahoma and Texas where tractor increases were greatest, and where the highest proportion of farmers had tractors.

Reference to the distribution of losses by tenure by race shows that the greatest relative decreases occurred within the Negro group, and that whereas the losses in the white group occurred among the tenants, and especially the sharecropper portion of the tenant group, the losses among the Negroes occurred in all tenure groups with the relatively greatest losses occurring in the tenant group but with very little difference between the croppers and other tenants.[5]

5. Unfortunately, the figures for states and counties by tenure and race for the 1940-45 period are not yet available. Their use, however, in this connection would be limited somewhat by the increased number of families listed as farm operators by the Census because of its inclusion of all families living on three acres or more of land and of all families having farm products valued at $250 or more. Both of these definitions brought into the Census listing numerous families in many states who were industrial workers living on small rural homesites and commuting to factory employment but whose victory gardens surpassed the $250 produce value mark and so placed them in the Census farmer group.

30 to 1940, and percent change of total Farm Operators 1940 to 1945*.

cent Change by Tenure and Race 1930–1940

White				Nonwhite			
Total	Owner	Cropper	Other Tenants	Total	Owner	Cropper	Other Tenants
0.8	4.2	-36.8	2.7	-25.7	-15.6	-23.9	-34.6
-1.4	10.9	-37.0	-2.3	-22.9	-4.7	-23.9	-32.3
-5.7	11.4	-46.9	-4.4	-23.7	-2.3	-24.3	-32.8
2.0	9.9	-24.0	3.0	-22.7	-5.0	-31.1	-26.4
6.8	7.5	-1.1	7.1	-11.6	-9.1	-13.2	-17.3
7.5	11.6	-2.3	3.9	-21.6	-7.4	-23.0	-32.0
-5.3	10.6	-36.2	-8.2	-20.8	6.5	-28.9	-27.0
-7.1	8.7	-38.5	3.8	-31.9	-9.9	-40.7	-24.5
9.5	12.2	-31.5	14.9	-11.6	-1.9	-23.8	-21.2
2.1	10.5	-27.3	3.8	-17.0	-2.9	-8.9	-33.0
4.2	7.8	-18.8	5.4	-39.1	-24.3	-51.6	-51.6
4.3	13.5	-18.2	-2.8	-20.4	-12.3	-16.2	-32.7
-3.2	6.4	-41.3	10.9	-21.8	-1.5	-29.2	-23.8
1.4	16.3	-27.6	0.7	-12.8	3.3	-0.9	-40.6
-7.1	12.3	-58.0	-8.0	-30.3	-6.1	-35.4	-37.1
-1.9	16.0	-50.8	-1.0	-28.4	-7.9	-27.1	-41.1
3.1	14.5	-29.8	5.8	-19.2	6.1	-14.5	-32.8
-8.2	8.0	-76.1	-8.4	-40.8	-27.2	-77.9	-35.3
-10.8	11.7	-63.8	-12.3	-38.7	-2.8	-59.0	-39.0

945.

klah

oma.

The number of families displaced per tractor varies with conditions, but all studies indicate that one or more families are replaced by each additional tractor.[6] Though there are, of course, numerous other considerations involved, the decrease of over 335,000 farm operators in the 13 Southern States from 1930 to 1945 looks reasonable when compared with the increase of 133,000 farm tractors during the 15-year period.

Important as have been the changes brought about already by the use of farm machinery in the South, there are many indications that vastly greater changes lie in the near future.[7]

This mechanization in the older parts of the Cotton Belt is not

6. "Technology on the Farm," *Ibid.* p. 64, reports a reduction of two families per tractor on large plantations; Saville, "Trends in Mechanization and Tenure Change in the Southeast" reports a reduction of one to five families for each tractor added. Vance, *All These People, Ibid,* p. 210, points out that "while it may be reasonable to conclude from these figures that one tractor takes the place of one farm family, the rate of displacement may be accelerated as the rationalization proceeds.

7. There is a great body of literature, scientific and otherwise, developing around the mechanization of cotton production. For a most recent discussion see "Exit King Cotton," Peter F. Drucker, *Harpers Magazine,* May, 1946.

Table 3. Number of Farm Operators in the South in 1930, 1940, and 1945, by Tenure a

Tenure	1945	1940	1930
Total for South[3]	2,901,000	3,007,170	3,223,816
Full owners and managers	1,505,000	1,341,270	1,208,041
Part owners	206,000	216,607	224,992
All tenants	1,190,000	1,449,293	1,790,783
Croppers	435,000	541,291	776,278
White	2,228,000	2,326,904	2,342,129
Full owners and managers	1,346,000	1,199,003	1,066,716
Part owners	179,000	185,246	183,469
All tenants	703,000	942,655	1,091,944
Croppers	167,000	242,173	383,381
Nonwhite	673,000	680,266	881,687
Full owners and managers	159,000	142,267	141,325
Part owners	27,000	31,361	41,523
All tenants	487,000	506,638	698,839
Croppers	268,000	299,118	392,897

[1]Bureau of the Census. Data for 1945 are preliminary estimates.
[2]Minus sign (–) indicates decrease.
[3]Note that this table is for entire Census South, 16 states and District of Columbia, rather t
table because 1945 Census data for tenure of farm operators by race are not yet available

occurring because the people there want to change their way of farming so much as because it has become imperative that changes be made: (1) because of the imbalance between urban and rural economy growing out of the lack of mechanization on farms; (2) because of the relative decrease in the supply of labor in recent years and the rise in farm wages; and (3) because of the shrinking position of cotton, especially in the Southeast. In 1880, the United States produced nearly four-fifths of the world's cotton, and almost four-fifths of this was from the states east of the Mississippi River. By 1939, the United States was producing only two-fifths of the world supply, and 55 percent of this was produced west of the Mississippi.

It's no mystery, or secret, why most cotton farmers have had small incomes and big debts. They have been using the money earned in a hand economy to buy consumer goods in a machine economy, and enough has not been earned to satisfy increasing wants. Work as hard as he may, a man with a mule can't win when he's living in an economy where most other men use machines. Families with low incomes can't pay the current costs for adequate medical and dental care, they can't live in very good houses, and they can't afford many modern conveniences. Goods can, of course, be made on machines cheaper than by hand, but thus far they have not been made enough cheaper on machines to offset the cotton farmer's rising wants on the one hand and his continuing low income on the other.

nd Race; and percentage change by Tenure and Race during specified Census periods[1]

Change by Census periods[2]

1940–1945		1930–1940		1930–1945	
Number	Percent	Number	Percent	Number	Percent
-106,170	-3.5	-216,646	-6.7	-322,816	-10.0
163,730	12.2	133,229	11.0	296,959	24.6
-10,607	-4.9	-8,385	-3.7	-18,992	-8.4
-259,293	-17.9	-341,490	-19.1	-600,783	-33.5
-106,291	-19.6	-234,987	-30.3	-341,278	-44.0
-98,904	-4.2	-15,225	-0.7	-114,129	-4.9
146,997	12.3	132,287	12.4	279,284	26.2
-6,246	-3.4	1,777	1.0	-4,469	-2.4
-239,655	-25.4	-149,289	-13.7	-388,944	-35.6
-75,173	-31.0	-141,208	-36.8	-216,381	-56.4
-7,266	-1.1	-201,421	-22.8	-208,687	-23.7
16,733	11.8	942	0.7	17,675	12.5
4,361	-13.9	-10,162	-24.5	-14,523	-35.0
19,638	-3.9	-192,201	-27.5	-211,839	-30.3
-31,118	-10.4	-93,779	-23.9	-124,897	-31.8

han for the 13 Southern States used in Tables 1 and 2. The Census South was used in this for the 13 individual states used in Tables 1 and 2.

At present, with farm workers relatively more scarce and higher paid than usual, there is considerable pressure toward mechanization. But quite aside from these immediate considerations, and perhaps more important, is the fact that Southern cotton needs to free itself from the shackles of high cost operations, so as to be produced on a basis more nearly comparable with production in the rest of our economy. Lower costs of production can increase the earning of farmers, and enable cotton to compete on better terms at home and abroad. Cotton cannot be produced cheaper by hand methods without further lowering the level of living of the families that grow it. The only way to produce cheaper cotton is to increase the mechanization of cotton production.

A few mechanical cotton pickers have been used successfully for the last few seasons. Others will be used as soon as available, particularly in the more level and more fertile cotton areas. Another mechanical development of importance is the already commonly used two-row harvester stripper in the Plains areas of Texas and Oklahoma. Another stripper is being developed for Delta cotton, and some planters expect it to be used widely in a few years, particularly after the first picking has been taken care of by hand labor or mechanical pickers. Recent improvements in ginning equipment make more feasible the expanded use of mechanical pickers and strippers. Other current developments include the practice of cross-cultivating the

growing cotton, which eliminates much of the chopping expense, and the experimentation of weeding by flame throwers, designed to eliminate the need for practically all hoeing and plowing.

I've seen whole big fields of good cotton grown without the use of a hoe, a mule or a hand picker. The growers were pleased with the results, and expected to expand their mechanized operations. On experimental plots at the Mississippi Experiment Station at Stoneville cotton was planted in hills, and the weeds and grass were kept down with a flame hot enough to kill them but not hot enough to harm the cotton stalks. We've all heard that a cotton stalk is tough. Well, it is, and science can take advantage of that fact. The outcome of this experiment at Stoneville in which no plow or hoe was used — only the flame thrower — was that cotton was grown at the rate of 2,033 pounds of seed cotton per acre as compared with a rate of 2,141 pounds per acre on the plots that were plowed and chopped. Fifteen to twenty-five acres can be flamed in one day by a two-row machine, at a fuel cost of $3.50 to $5.00 per day. Two men operated the machine, but anticipated improvements will permit its operation by one man.[8]

8. Adopted from "Control of Weeds and Grasses in Cotton by Flaming," Mississippi State College Agricultural Experiment Station, Circular No. 118, March, 1944. See also Bill Tipton, "Mechanical Cultivation and Picking of Cotton, Dream of Industry Comes True," *Acco Press*, Houston, Texas, Nov. 1944, Vol. XXII, No. 11; and *Newsweek*, Feb. 18, 1946, pp. 65-66.

One man with a mechanical cotton picker can pick as much cotton in a day as almost half-a-hundred ordinary hand-pickers.

This little girl is eight years old. Many children learn to pick cotton at an early age. Although a moderate amount of work by a child on the home farm is a wholesome activity, too much field work by children leads to irregular school attendance and to health hazards.

To get ready for picking by the mechanical picker, the green leaves are usually disposed of by the application of a fine spray of calcium cyanamide which causes the leaves to shrivel up and fall off. For large fields this can be applied by airplane for around $1.75 per acre. This defoliation more than pays for itself, even if the cotton is picked by hand, for the cotton bolls open up better when the leaves are off so the sun can get to them.

Indications are that much cotton may soon be harvested by mechanical pickers cheaper than it could be picked by hand. The detailed figures vary somewhat, but it now at last seems to be agreed that the mechanical picker is a practical reality.[9] The groundwork has already begun for a giant plant at Memphis where one mechanical picker will be manufactured by mass production methods. Two other pickers, too, may go into production soon.

Last October I was told by the operators of a plantation using 15 mechanical pickers that these pickers get about 95 percent of all the

9. Frank J. Welch and D. Troy Miley, "Mechanization of the Cotton Harvest," Mississippi State College Agricultural Experiment Station, Bulletin 420, June 1945; also *Journal of Farm Economics*, Vol. XXIII, No. 4, Nov. 1945, pp. 928-946, for an article of the same title by authors Welch and Miley. See also, Tipton's article; and "Looking Ahead with Cotton," Misc. Pub. No. 584, U. S. Department of Agriculture.

open cotton, that they do not injure the unopened cotton, that the grade of mechanically picked cotton was then about the same as that of hired local pickers — not quite so good as when the farm family picks its own cotton, but better than when hired outside workers pick it. The cost for picking with machines was as low as cotton had ever been picked on that plantation by hand, that is, less than half of the $2.10 per cwt. being paid hand pickers last fall. Almost any first-class tractor driver, he said, can soon learn to operate the picking machine. It moves along the row at two miles an hour, and picks about six acres a day. In bale-an-acre cotton, it can do the work of 40 or more ordinary hand pickers.[10]

It is significant that new gin equipment that has been developed recently offsets most of the earlier loss of grade from mechanical picking. Recent reports show that the fiber quality of mechanically picked cotton is superior to that of hand picked cotton,[11] and also that cotton harvested by mechanical pickers at night has better fiber strength than day picked cotton. One of the greatest handicaps of the mechanical picker is that it cannot be used when the ground is excessively wet, but thus far mechanized plantations have been able to harvest all or most of their cotton ahead of fields getting too wet. The mechanical one- and two-row boll strippers used in Texas and Oklahoma Plains also have demonstrated clear savings over old hand methods of stripping or picking.[12] Still greater savings are effected when four-row equipment is used for planting and cultivating.[13]

10. For a recent newspaper report on the use of mechanical pickers see Agnes E. Meyer's "Machines, Migration, Factory Methods Reach Farm," *Washington Post*, May 6, 1946.

11. W. M. Garrard, Manager of the Staple Cotton Cooperative Association of Greenwood, Mississippi, is quoted in the *Memphis Commercial Appeal* of Oct. 27, 1944, as saying that cotton mills were seeking more machine picked cotton because the fiber of the machine picked cotton is superior to that picked by hand.

12. "Harvesting Cotton in the High Plains Area of Texas," Bureau of Agricultural Economics and Texas Agricultural Experiment Station, Progress Report No. 952, August 1945, pp. 17-19.

13. "Agricultural Production, Texas, 1950," prepared by the Bureau of Agricultural Economics and Texas Agricultural Experiment Station Cooperating, Jan. 1945, p. 13.

How long will it be before cotton fields like these are worked entirely with machinery? How many of these tenant houses will be occupied then?

Machines Replace People

THE greater mechanization of cotton production which now appears within reach means that the amount of cotton grown per family will increase, and that the cotton-growing families that use machinery can afford better houses, more home conveniences, more adequate medical care, and that the organizations and agencies which farm families maintain can be more adequately financed. The other side of this picture is that fewer farm families will be needed in the best land areas as mechanization replaces the old methods of hand production. The number of cotton farmers who will be displaced each year will depend on the rate at which farm machinery is put into operation, on whether effective ways are worked out to assist erstwhile cotton farmers to shift to other types of farming, whether there is full industrial employment and ready markets for farm products, whether the national income remains high, whether there is an expansion of industry in the South, and so on.

Be these unknowns as they may, it is estimated that the labor needed to produce the cotton in the Plains of Texas and Oklahoma will be reduced 59 percent by 1950 by the further use of the mechanical strippers.[14] The reduction of farm families in the Mississippi Delta and in the scattered better cotton areas of the Southeast will be great, too. Welch and Miley of the Mississippi State College Agricultural

14. *Ibid.*, p. 11.

As the use of farm machinery continues to increase, fewer people are required to do the work, and many tenant houses are being abandoned like the one on the opposite page.

Experiment Station mention 55 to 65 percent displacement of farm families in the 10 all-Delta counties of Yazoo-Mississippi area as a conservative estimate if there is a widespread adoption of the picker.[15] In Georgia a group of agricultural experts estimated that 2,500 mechanical pickers would be needed in the State by 1950.[16].

The mechanization of cotton production on the fertile level lands will also affect the farmers in the hills who grow cotton—not so much because the picking machines will at first be used there as because the hill farmers will sell their hand-produced cotton in competition with the machine-produced cotton. So, if machine-produced cotton means cheaper cotton, it thereby also means that the level of living of the mechanized cotton farmer in the hills will be further lowered. Seemingly one of the best alternatives for the hill farmer is to develop livestock enterprises, but this, too, will require more land per family. Here will be another group of dislocated families in need of nonfarm employment.

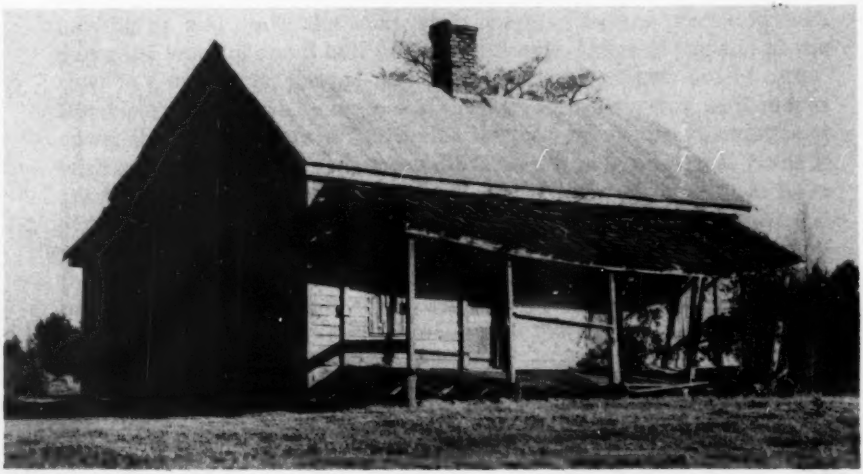
An overall estimate by the Bureau of Agricultural Economics indicates that with full employment opening up nonfarm job opportuni-

15. *Op. cit.*, Miss. State College Bulletin, p. 22.
16. "Post-war Adjustment in Agricultural Production in Georgia," a mimeographed report of the State Agricultural Production Capacity Committee, Dec. 1, 1944, p. 10.

ties and a concerted effort to help some farm families to enter other occupations, the number of people working on Southern farms would probably shrink from 4,400,000 persons in 1940 to around 2,800,000 in 1956, a drop of 1,600,000 in the 16-year period. Some of this shrinkage would occur in the sugar cane and rice areas and in the tobacco and subsistence counties, but most of it would be in the extensive cotton portions of the South, and especially the better farming areas of the Old South that are still least mechanized.

When thinking of the alternative employment opportunities for the people who leave Southern farms, it is well to remember that most of these families, especially those from the plantation areas, have had little experience that prepares them for industrial employment. Most of them have been sharecroppers and wage hands and as such have secured but little education, know practically no skills other than hoeing and picking, and have had but little experience in making decisions for themselves. Heretofore when people have been attracted out of the plantation areas by industrial work, as during World War I and II, it has been the more unattached younger men and women, usually the better educated ones, who have migrated. But as mechanization of cotton production develops, there will be local work only for those who know best how to operate tractors and repair machinery, and who can most readily read and understand instructions. The group that will not be needed on the mechanized cotton farms will be the very group that is least qualified by training and experience to fit immediately into industrial employment.

Some may look at this whole cotton situation and say it is wrong for people to be pushed off the land, and that therefore the mechanization of cotton production should not be permitted. But there is no more reason to put restraints on the mechanization of cotton produc-



tion now than there was to have stopped the use of machinery in factories, or of steam locomotives on the railroads, years ago. No one, I think, would argue that shoes should be produced by hand, that wheat on the Plains should be cut with a cradle, or that automobiles should be made in a blacksmith's shop by one or two mechanics. Cotton is simply one of the last great enterprises to be mechanized.

There are, of course, serious human problems involved in the mechanization of cotton production — farmers pushed off the land, the closing out of some local schools and churches, the migration of families to new areas, and the painful business of learning to live in a strange environment. Then there is the likelihood that as the mechanization of cotton production pushes families off the land, some local and distant employers may take advantage of the plight of these displaced people by offering work at very low wages. These are real problems, but let's not let ourselves overlook the equally important fact that great human problems have been involved in the very lack of mechanization of cotton production — small farms, low incomes, child labor, irregular school attendance, poor housing, credit farming, excessive soil depletion, inadequate medical care for a great proportion of the lower-income families.

It stands to reason, however, that since the mechanization of cotton production will increase only if cotton can be grown more cheaply with machines than by hand methods, that society as a whole will be not less able but rather more able to take care of the displaced cotton workers by using the effective machines than if less effective hand methods were continued. The real problem involved here is that of securing a wider spread of the social and economic benefits of modern machinery and technology.

The Face of the Future

THIS basic problem of our civilization is thrown into sharp relief when the new machines (representing tomorrow) are posed against a backdrop of great cotton fields in which are scattered weather-beaten sharecropper cabins (representing yesterday). Stand there between yesterday and tomorrow at the edge of the cotton fields and look at a half-dozen mechanical cotton pickers mounted on tractors moving up and down the rows, each operated by one man, and each doing the work of about half a hundred people. There at the end of the rows is a mechanic, just in case one of the pickers gets out of order. But most of the time he is idle. Each big red sputter-bug as it moves down the row gathers up its half-bale load on its back, empties it with a hydraulic lift, turns around and is off on a new row. So it is all day long, and at evening the six men on the six machines have picked more cotton than would have been gathered by 250 to 300 hand pickers. Night picking would double that amount. Today a few of the occupants of tenant cabins are standing there looking as the machines go down their first rows. Most of them know little or nothing about the mechanical picker, but the talk is spreading.

Some of the sharecroppers and wage hands who have heard about it dispose of the matter with, "Well, we always have got along, and guess we always will." Others, with alarm in their faces, say, "You

Recent improvements in ginning equipment and the installation of re-drying units and hull extractors (long in use in the dry plains of West Texas and Oklahoma) in gins in the Delta and Southeast make the harvesting of cotton by mechanical cotton pickers in the humid eastern areas much more satisfactory than heretofore. Above, farmers wait their turns at the gin. On the opposite page, bales of cotton stand ready for mills.

know, the way that thing picks cotton, we'll not be needed for long, will we?" They wonder what will happen to them then. A few, usually the better educated and those who have been to other parts of the country, look upon these mechanical pickers and other farm machinery as providing an opportunity for a second emancipation for propertyless plantation workers. They point out, often with a real understanding of local conditions, that most of the tenants, sharecroppers, and wage hands never had an adequate level of living, and that they never can have so long as they produce cotton by hand, as dependent workers.

The real question we face when we look at the mechanization of cotton production is the same question we are up against in the general use of our machines and technologies, namely, how can we make modern machines and technologies serve human needs more effectively?

Looked at in one way, the most tragic thing I know about our civilization is that the only two times since I can remember when the labor of all our people has been needed were during World War I and World War II. We were all needed then, and we all knew it, and we were glad to work long and hard. During most of the rest of the time, there has been need for more consumers than producers. A few months ago I heard a national figure say four factory workers were then producing as much goods as five were when the war broke out, and that by the beginning of 1947 three will be doing the work of the four. The technological advancement that is just reaching the cotton fields still moves rapidly ahead in the areas longest mechanized.

Looked at in another way, this fact that in recent years the labor of all of us has been needed only during wars constitutes our greatest hope. It demonstrates that we as a people no longer need to be at hard labor all the time. We can now, thanks to modern machines and technologies, create through moderate work enough goods and services for our needs, and have the time and energy and resources for our own personal growth and for the development of more adequate community services than we've ever known. We have plenty of time now to stop our gullies and restore our soil, arrange for comfortable housing, maintain adequate educational and health facilities, and organize recreational activities in which we can all participate, if we like. Such are the possibilities within our reach. The harnessing of atomic energy for peacetime uses may open up much greater uncharted areas. But when our ability to create goods and services outruns the ability of our people to buy them, many low income families suffer and our whole economy founders.

In thinking of possible experiments and general approaches in preparing displaced workers for nonfarm employment, it is well that the way the displacement of workers will occur be anticipated. Displacements will occur farm by farm, much as has been the case up until now as the number of farm tractors has increased. Each mechanical picker will, however, displace more workers at one time than the tractor, and will displace them more completely, especially since cotton picking is the one remaining big hand process in cotton production. Hand workers will commonly be thought of as surplus labor only after a mechanical picker has been put into operation on a particular farm. Other nearby planters may continue with traditional hand methods of operations for another year or two, while some few growers may continue hand methods of production because of the ease with which they can secure from among the families already displaced by mechanized farms the very kind of workers they like to use. The point here is that the workers will be displaced farm by farm, year by year, and that those operators still relying on hand

methods of production will remain as dependent as ever upon the availability of workers. In short, hand workers on any given cotton plantation are indispensable as workers right up to the time that they are displaced by machine pickers when most of them will not be needed at all.

In the light of these practical considerations, it appears that dependent hand workers can be prepared for nonfarm employment (1) through special training arranged in the local community for those who have been pushed off the mechanized farms and who are not wanted by other local operators; (2) through the recruitment and placement by the employment agencies of such persons in nonfarm work, wherever it is available; and (3) through such indirect and long-time means as better schools, more vocational training (for children and adults), expanded public health services, wider social security coverage, and the like. Concrete practicable activities need to be gotten under way now to help displaced families go through the transition with as little frustration and hurt as possible.

Then there is the question of what relationship to the land the people will hold who do the work on these newly mechanized farms of the South. The increased mechanization may result in the further concentration of the better lands into large holdings, with most of the people who operate the farm machinery occupying the status of hired workers. Certainly up until now the benefits of mechanized cotton production have gone largely to the big operators. On the other hand, as time passes a more widespread use of cotton producing machinery may result in a relative increase in the proportion of the farm work that is done in the Cotton South by the farm operators themselves. That's just what happened as mechanization increased in the Corn and Wheat Belts of this country. Improved farm machinery in each of these areas increased the proportion of all farm work that was done by the labor of the farm family. Before the coming of the combine, for example, great hoards of transient harvest workers were used in the wheat harvest each year. Now the number is much smaller, and a larger proportion of those who are used are expert tractor drivers, combine operators, and machinists. In many instances the farm family itself can take care at harvest time of its entire acreage. Similarly the expanding use of the corn harvester is making it possible for farm families to do their own work, and not have to depend on either local or imported hired workers. On dairy farms, too, improved machinery has resulted in the opportunity of the operator family to do more of the work and to raise its own level of living.

In those areas of the South where there are many small independent farmers, perhaps ways can be found for most of them to stay on land and to benefit by a moderate use of farm machinery. Small operators can be served by their neighbor's machinery when custom

work is done at equitable rates. Also a group of small farmers can own and operate machinery jointly. Cooperatives might prove helpful to the small, independent farmer in securing the advantage of machinery without being saddled with uneconomic equipment and without losing most of his neighbors in developing a satisfactorily large farm unit for himself. It is not implied here that the present farms in the poor land areas are large enough if properly managed, but it is important to remember that the increase of the size of the farm is but one of the ways to develop an adequate farm unit.

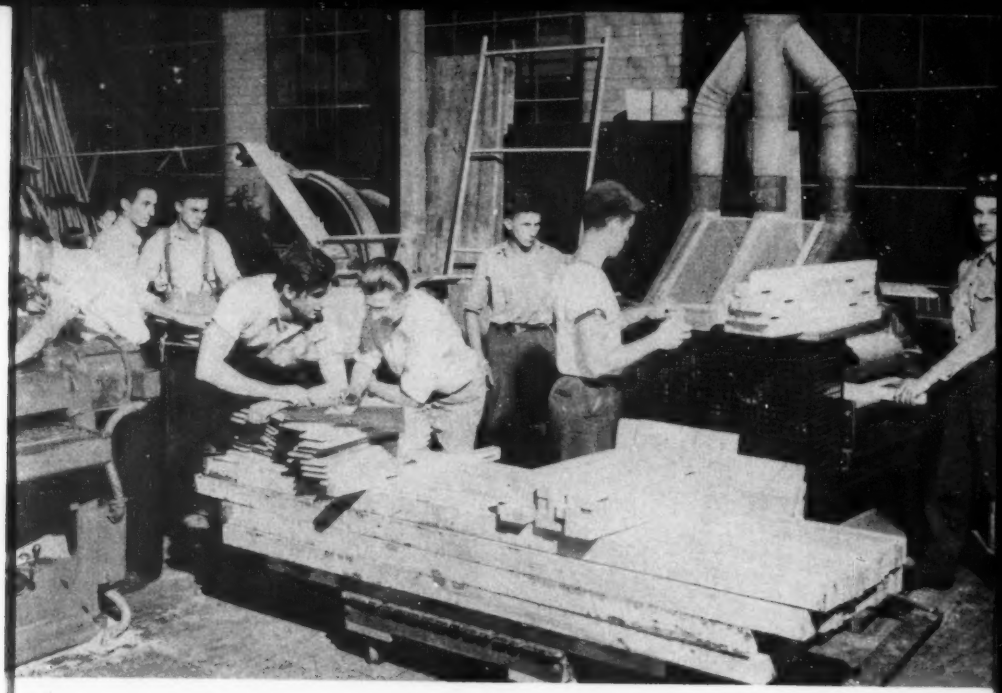
Part-time off-farm work will be helpful in many areas in stabilizing the small, independent farm families on the land. Another important alternative is the increased production of foodstuffs for the farm family itself, and also for the Southern urban market into which now great quantities of meat, dairy and poultry products, and vegetables are shipped from the outside. But small farmers can take advantage of this market only by arranging to produce standardized products and work out group arrangements for marketing them.

There is a great need for constructive concerted group action in the local community. How can adequate educational and health facilities be provided for children and adults, landowners, tenants, and hired farm workers? What new activities should be launched by the vocational agricultural people, the Agricultural Extension Service, the Farmers' Home Administration and other agricultural agencies, the churches, and the farmers' organization to help as many families as practicable to make a good living on farms, and to help those who leave the farms to get ready to do something else?

At its worst the role of agricultural technology in Southern social change will be that of pushing the hand workers out of the low-income niches they now occupy in our economy and leaving them helpless and inarticulate wards of society. At its best, agricultural technology will arrange opportunities to prepare those who leave cotton farms for life elsewhere and provide the means to restore the soil and to improve the living conditions of those families who remain on the land.

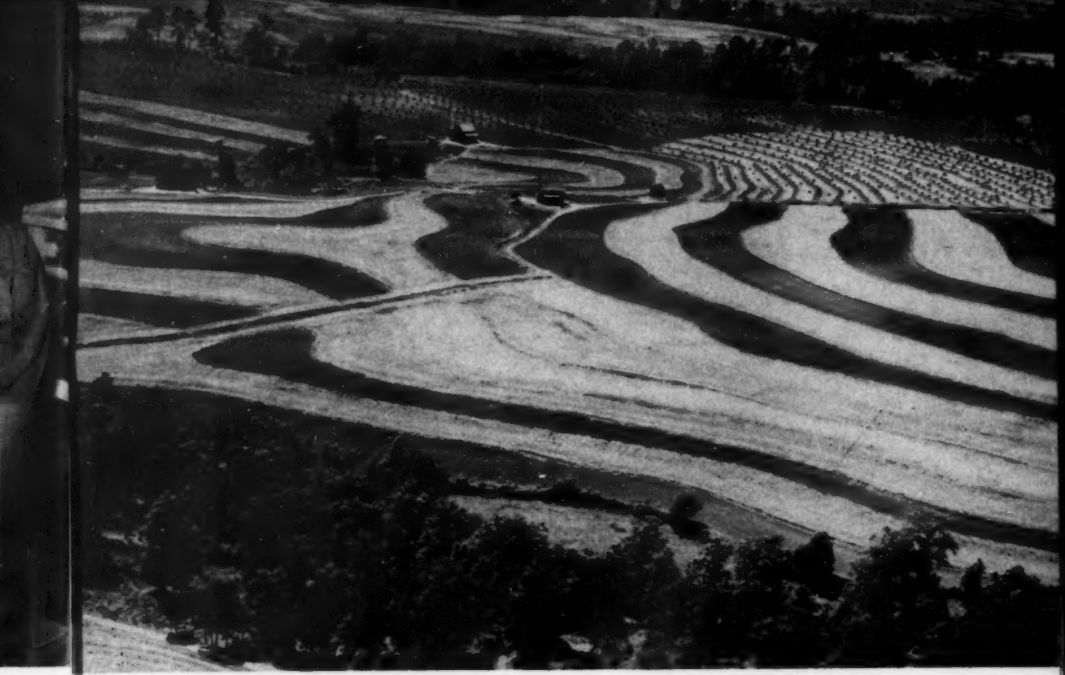
What To Do?

Mechanization is proceeding on Southern farms and the number of farmers continues to decline. The people who remain on the land face many changes and the problem of adjusting to those changes. The following pages suggest some types of action that appear to be necessary to the people of the South, especially those who remain on the farms:



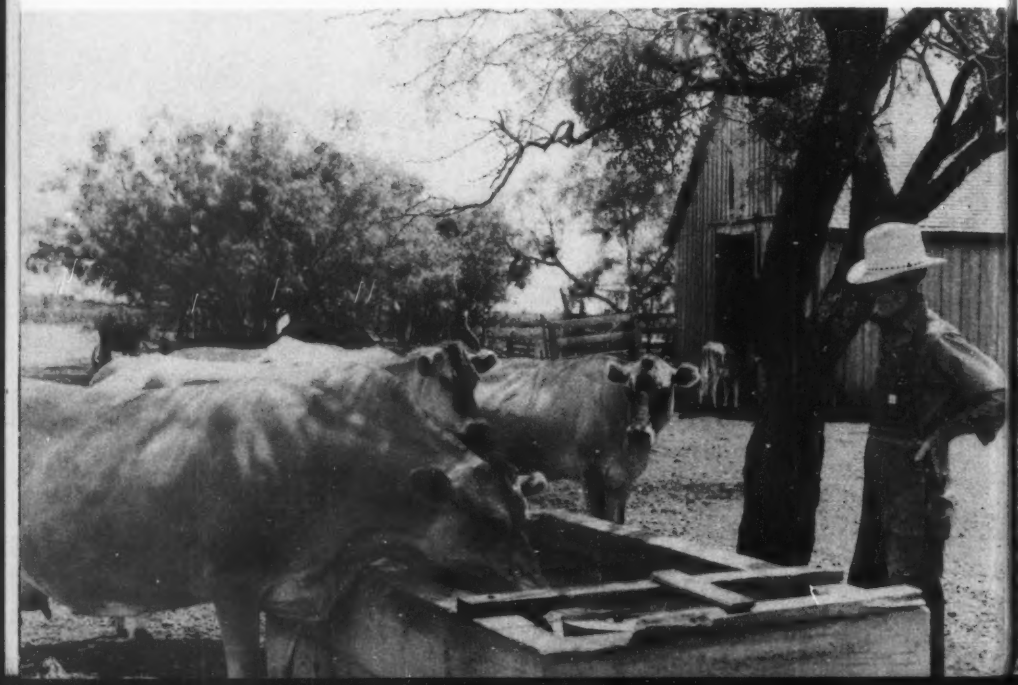
The South needs better schools and more vocational training.

The South needs more and better health facilities — and more good farm buildings.



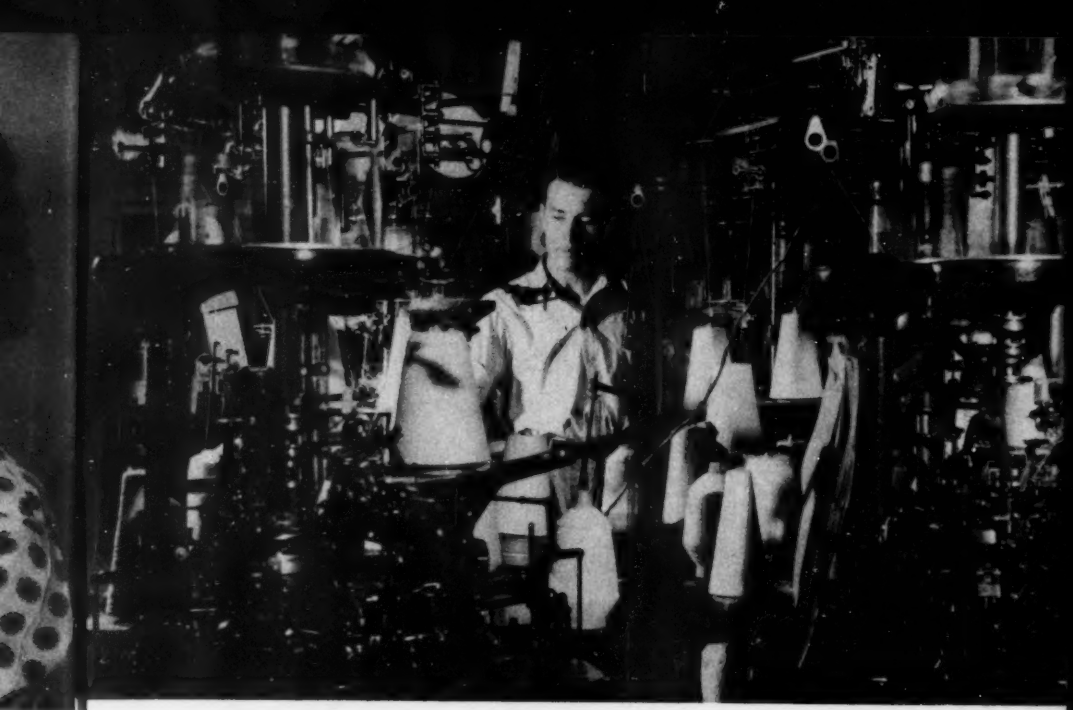
The South needs more conservation of the land through terracing, contour plowing, and more soil-building crops.

The South needs more trees on severely eroded land and on steep hillsides —
— and more livestock, cows, hogs and hens.

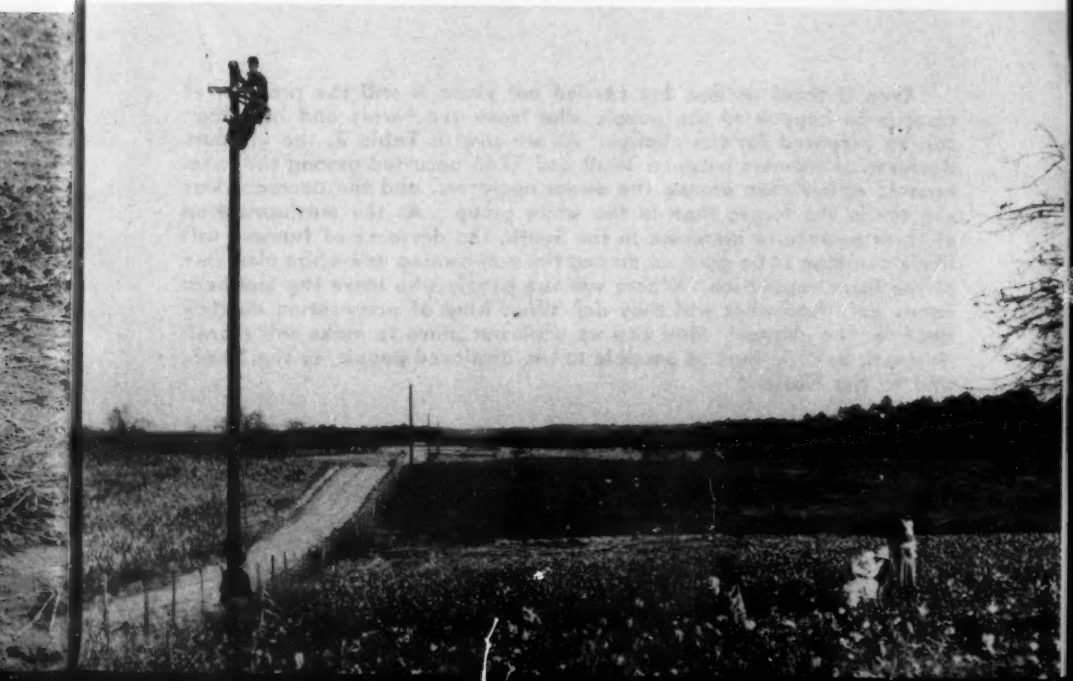


The South needs more farm machinery for non-cotton crops as well as for cotton — — and more good home gardens.

The South needs more canned foods, more dried foods, more deep freezing units —
— and more potato hills.



The South needs more local industries to provide employment for rural people —
— and more complete electric power services to rural areas.



The South needs more opportunities for the people to sit down together and work out answers to their problems.

Even if these actions are carried out there is still the problem of what is to happen to the people who leave the farms and how they can be prepared for the change. As we saw in Table 3, the greatest decrease of farmers between 1930 and 1945 occurred among the farm tenants rather than among the owner-operators, and the decrease was greater in the Negro than in the white group. As the mechanization of farm operations increases in the South, the decrease of farmers will likely continue to be greatest among the non-owning non-white elements of the farm population. Where will the people who leave the Southern farms go? And what will they do? What kind of preparation do they need for the change? How can we work out plans to make this transition with as little hurt as possible to the displaced people, to the South, and to the Nation?

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